

were inundated to depths of from one to fifteen feet for a distance of six miles. Many residents were driven to the upper stories of their dwellings. It is estimated that the losses will amount to \$100,000.

HIGH TIDE.

Eastport, Maine, 4th, 5th.

LOW TIDE.

New Haven, Connecticut, 11th.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; and the mean temperature of the air:

Temperature of water for March, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	44.5	29.8	14.7	3 6	31.4
Alpena, Michigan*	56.4	41.0	15.4	8 9	49.5
Augusta, Georgia	38.5	33.7	4.8	10 0	35.3
Baltimore, Maryland	37.0	49.2	7.8	6 9	29.8
Block Island, Rhode Island	33.2	29.2	4.0	21 4	27.9
Boston, Massachusetts	53.8	44.9	8.9	15 8	49.5
Canby, Fort, Washington Territory	57.5	59.8	7.7	9 3	58.7
Cedar Keys, Florida	53.3	49.7	3.6	40 9	52.2
Charleston, South Carolina	40.6	21.0	19.6	3 4	35.7
Chicago, Illinois*	54.2	32.2	2.0	15 7	22.8
Chincoteague, Virginia †	64.7	54.2	10.5	12 7	60.7
Cleveland, Ohio*	66.9	54.6	12.3	8 3	60.3
Detroit, Michigan*	64.6	57.0	7.6	18 0	57.6
Duluth, Minnesota*	83.0	59.4	13.6	17 2	70.8
Eastport, Maine	55.3	42.8	12.5	5 1	45.3
Escanaba, Michigan*	58.5	49.0	9.5	16 7	53.5
Galveston, Texas	38.4	30.0	8.4	16 0	26.9
Grand Haven, Michigan*	35.8	33.2	2.6	11 0	29.7
Indianola, Texas	35.8	31.2	4.6	14 0	29.7
Indianapolis, Indiana	45.9	35.0	10.9	10 4	40.8
Jacksonville, Florida	59.7	50.0	9.7	17 1	54.8
Key West, Florida	33.3	30.1	3.2	16 7	27.4
Mackinaw City, Michigan*	54.5	43.3	9.2	50 3	52.0
Macon, Fort, North Carolina	39.1	32.9	6.2	1 8	30.5
Marquette, Michigan*	56.9	54.8	2.1	36 6	56.6
Milwaukee, Wisconsin*	57.3	49.0	8.3	9 1	54.3
Mobile, Alabama	57.2	43.6	13.6	11 0	45.8
New Haven, Connecticut †	51.3	43.8	7.5	14 5	49.3
New London, Connecticut					
New York City					
Norfolk, Virginia					
Pensacola, Florida					
Portland, Maine					
Portland, Oregon					
Sandusky, Ohio*					
Sandy Hook, New Jersey					
San Francisco, California					
Savannah, Georgia					
Smithville, North Carolina					
Toledo, Ohio*					
Wilmington, North Carolina					

* No observations made on account of ice. † Record for 23 days. ‡ Record for 23 days.

VERIFICATIONS.**INDICATIONS.**

The detailed comparison of the tri-daily indications for March, 1885, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 85.87 per cent. The percentages for the four elements are: Weather, 90.00; direction of the wind, 81.68; temperature, 83.28; barometer, 90.09 per cent. By geographical districts, they are: For New England, 86.24; middle Atlantic states, 88.78; south Atlantic states, 88.50; eastern Gulf states, 87.34; western Gulf states, 86.73; lower lake region, 86.83; upper lake region, 83.98; Ohio valley and Tennessee, 86.05; upper Mississippi valley, 83.97; Missouri valley, 78.46; north Pacific coast region, 80.36; middle Pacific coast region, 97.32; south Pacific coast region, 99.11. There were sixteen omissions to predict out of 3,384, or 0.47 per cent. Of the 3,369 predictions that have been made, forty-seven, or 1.40 per cent., are considered to have entirely failed; one hundred and twenty-four, or 3.68 per cent., were one-fourth verified; three hundred and sixty-four, or 10.80 per cent., were one-half verified; six hundred and sixteen, or 18.28

per cent., were three-fourths verified; 2,218, or 65.84 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During March, 1885, two hundred and sixty-eight cautionary signals were ordered. Of these, two hundred and thirty-four, or 87.31 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. One hundred and fifty-six cautionary off-shore signals were ordered, of which number one hundred and twenty-two, or 78.21 per cent., were fully justified both as to direction and velocity; one hundred and forty-seven, or 94.22 per cent., were justified as to direction; and one hundred and twenty-eight, or 82.05 per cent., were justified as to velocity. Four hundred and twenty-four signals of all kinds were ordered, three hundred and fifty-six, or 83.96 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, one hundred and fifteen were changed from cautionary signals. In forty cases winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During March, 1885, there were eighty cold-wave signals ordered, of which number, seventy, or 87.5 per cent., were justified.

RAILWAY WEATHER SIGNALS.

The following is from the report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr.:

The predictions for the month of March, telegraphed by General Hazen, the Chief Signal Officer, were as follows:

Local rains.—4th, 12th, 13th, 15th, 21st, 22d, 25th, 26th, 27th, 28th.

Fair weather.—1st, 2d, 3d, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 14th, 16th, 17th, 18th, 19th, 20th, 23d, 24th, 29th, 30th, 31st.

Lower temperature.—13th, 17th, 20th, 22d, 28th, 29th.

Higher temperature.—3d, 4th, 6th, 10th, 11th, 12th, 14th, 15th, 16th, 18th, 19th, 21st, 23d, 24th, 27th, 30th, 31st.

Stationary temperature.—1st, 2d, 5th, 7th, 8th, 9th, 25th, 26th.

Cold-wave signals ordered on the 28th.

A careful examination of all reports shows the verification of predictions to be 92 per cent. for temperature and 93 per cent. for weather.

ATMOSPHERIC ELECTRICITY.**AUROBAS.**

An extended display of the aurora occurred during the night of the 15-16th. Except at stations in Montana, where cloudiness prevailed, this display was observed throughout the northern part of the United States. To the eastward of the Missouri valley stations reporting it are very numerous, Nashville, Tennessee, being the southernmost point at which it was observed. In the northern plateau and north Pacific coast region this display was also reported by numerous observers.

The following reports have been received:

Spokane Falls, Washington Territory, 15th: a bright aurora appeared at 11.10 p. m.; there were three streamers of light pink color, which rose and fell at short intervals; the streamers were not vertical but were inclined towards the west.

Port Angeles, Washington Territory, 15th: an aurora was observed at 1.45 a. m., also at the 7 a. m. and at the 11 p. m. observations, with indications of its having continued uninterruptedly from the time of the first observation. When first seen no dark segment was observed, the horizon being obscured by groups of cirrus cloud, but an arch of light extended over about 150° of the northern horizon, with an elevation of about 40°; above the arch there appeared innumerable "merry dancers," which shot up to an elevation of about 70°. The maximum degree of brilliancy during the display was attained about 2.30 a. m. At the 7 a. m. observation the aurora was observed in the form of an arch of light, which flashed up in broad patches; at 11 p. m. the aurora was again observed, but was soon obscured by fog.

Lewiston, Idaho, 15th: an aurora was observed from 8.20 to 9.30 p. m.; it extended from 45° east of north to 15° west of

Table of miscellaneous meteorological data for March, 1885—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure.					Temperature of the air (in degrees Fahrenheit).										Winds.																	
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.				Monthly range.	Daily ranges.		Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Max. velocity.		No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.						
					Highest barometer.	Date.				Lowest barometer.	Date.	Max.	Date.		Mean max.	Min.							Date.	Mean min.					Greatest.	Date.	Least.	Date.		
New England.																																		
Eastport	61	29.84	+0.03	29.91	30.55	30	29.22	19.13	22.8	-5.9	43.3	28	28.5	-5.2	13	15.9	53.5	23.2	13	6.3	872.2	15.2	5.94	-0.65	7,759	nw.	43	se.	16	15	8	19	4	
Portland	45	29.90	+0.05	29.95	30.51	30	29.32	2.13	27.4	-5.4	51.9	28	38.3	1.1	13	19.7	50.8	30.6	15	8.6	463.8	16.4	0.99	-1.78	5,949	n.	26	n.	21	11	5	20	6	
Mount Washington	6,279	24.30	.....	29.82	30.34	30	29.04	20.130	2.1	9.0	28.2	27	14.4	-47.8	21	-5.6	70.0	25.9	22	10.8	299.1	0.0	1.55	-5.80	26,045	nw.	*	nw.	21	13	1	12	18	
Thatcher's Island	43	29.84	+0.05	29.97	30.49	30	29.40	2.1	10	27.9	-6.5	58.9	31	36.7	2.9	13	18.6	56.0	28.8	31	10.6	763.6	16.8	1.15	-3.81	10,277	w.	39	w.	10	9	7	16	8
Boston	122	29.84	+0.05	29.97	30.49	30	29.40	2.1	10	27.9	-6.5	58.9	31	36.7	2.9	13	18.6	56.0	28.8	31	10.6	763.6	16.8	1.15	-3.81	10,277	w.	39	w.	10	9	7	16	8
Point Judith	27	29.98	+0.09	30.00	30.51	30	29.49	2.1	03	29.8	-6.1	53.0	31	37.1	5.0	18	23.0	48.0	.....	9	5.6	778.5	24.0	0.92	-4.03	10,988	nw.	45	nw.	20	11	7	20	4
Block Island	27	29.98	+0.09	30.00	30.51	30	29.49	2.1	03	29.8	-6.1	53.0	31	37.1	5.0	18	23.0	48.0	.....	9	5.6	778.5	24.0	0.92	-4.03	10,988	nw.	45	nw.	20	11	7	20	4
Narragansett Pier	47	29.99	.....	30.03	30.52	30	29.51	2.1	01	29.7	-5.5	59.0	28	38.9	5.0	18	19.5	54.0	.....	9	8.0	709.1	20.4	1.02	-3.51	6,337	nw.	28	nw.	20	9	5	15	11
New London	107	29.91	.....	30.02	30.49	30	29.50	2.0	98	26.9	-8.7	53.2	31	36.0	-0.2	13	18.4	53.4	30.7	13	10.2	72.7	19.0	1.19	-4.01	5,760	n.	28	nw.	20	9	4	17	13
New Haven	107	29.91	.....	30.02	30.49	30	29.50	2.0	98	26.9	-8.7	53.2	31	36.0	-0.2	13	18.4	53.4	30.7	13	10.2	72.7	19.0	1.19	-4.01	5,760	n.	28	nw.	20	9	4	17	13
Middle Atlantic states.																																		
Albany	75	29.95	+0.07	30.04	30.46	30	29.53	2.0	93	23.1	-9.8	49.0	31	32.4	-5.5	13	15.0	54.5	29.7	24	9.1	776.6	13.3	0.62	-2.32	6,000	nw.	32	s.	9	10	7	14	10
New York City	104	29.87	+0.07	30.04	30.48	30	29.53	2.0	94	29.7	-8.7	58.2	31	37.9	-0.5	22	15.5	51.7	24.9	12	3.4	773.4	22.0	1.19	-2.90	8,888	nw.	48	nw.	10	10	7	16	8
Sandy Hook	23	30.03	+0.09	30.05	30.51	30	29.57	1.0	94	30.5	-7.1	56.8	31	37.7	7.4	21	23.2	49.4	21.6	9	5.9	770.2	21.8	0.67	-4.72	13,508	nw.	53	nw.	10	7	7	19	5
Barnegat City	22	30.03	+0.08	30.04	30.49	30	29.58	1.0	91	32.3	-5.3	54.9	31	41.3	9.4	21	25.6	45.5	25.7	24	5.0	777.7	25.9	0.23	-4.83	11,649	nw.	40	ne.	29	5	5	20	8
Little Egg Harbor	.....	30.03	+0.08	30.05	30.49	30	29.58	1.0	91	32.3	-5.3	54.9	31	41.3	9.4	21	25.6	45.5	25.7	24	5.0	777.7	25.9	0.23	-4.83	11,649	nw.	40	ne.	29	5	5	20	8
Atlantic City	13	30.03	+0.08	30.05	30.46	30	29.60	1.5	80	31.4	-7.1	55.3	31	43.7	8.5	21	24.8	46.8	26.1	9	5.5	782.7	20.6	0.95	-3.18	7,400	nw.	31	n.	29	9	6	19	6
Cape May	27	30.02	+0.08	30.04	30.46	30	29.60	1.0	85	34.3	-6.0	54.3	27	38.7	10.8	21	28.0	41.5	21.3	9	5.6	779.7	26.5	2.29	-2.89	12,476	nw.	54	nw.	20	15	7	20	4
Philadelphia	117	29.93	+0.06	30.05	30.48	30	29.59	2.0	89	30.8	-9.1	61.5	31	38.6	6.5	21	23.1	55.0	24.5	31	8.8	700.0	20.4	0.69	-2.69	8,115	nw.	24	nw.	20	7	7	18	6
Baltimore	45	30.02	+0.06	30.06	30.46	30	29.62	1.0	81	35.3	-6.8	68.4	31	42.6	11.8	21	28.4	56.6	28.5	31	7.4	1257.7	21.2	1.60	-2.51	4,876	nw.	22	nw.	20	12	8	18	5
Washington City	100	29.97	+0.06	30.07	30.48	24	29.63	1.5	80	34.5	-7.7	70.1	31	43.1	10.3	21	26.6	59.8	30.3	31	7.6	1267.0	24.0	1.53	-2.74	5,589	s.	24	nw.	20	9	5	19	7
Delaware Breakwater	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ocean City	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chincoteague	8	30.05	+0.08	30.04	30.48	21	29.61	1.0	87	35.7	-5.7	60.0	4	42.5	10.6	24	27.1	49.4	30.5	4	6.0	1778.9	29.4	2.25	-2.18	8,988	nw.	40	nw.	20	11	13	13	5
Cape Henry	16	30.00	+0.05	30.06	30.51	21	29.60	1.0	91	39.4	-7.9	67.9	31	49.0	20.6	21	32.7	47.3	32.7	10	5.5	1372.7	30.7	2.51	-3.68	10,287	n.	40	ne.	22	14	11	10	10
Norfolk	30	30.00	+0.08	30.07	30.49	21	29.64	1.5	85	40.8	-6.9	68.9	31	49.5	20.6	24	33.5	43.9	26.0	31	5.1	1371.9	30.9	3.04	-1.65	6,589	n.	20	ne.	22	14	10	14	7
Lynchburg	652	29.35	+0.04	30.05	30.46	24	29.63	1.5	84	39.0	-7.2	70.7	31	48.4	17.4	24	30.9	53.3	33.4	31	6.5	2004.8	27.1	1.18	-2.87	3,470	sw.	22	nw.	19	11	7	12	12
South Atlantic states.																																		
Kitty Hawk	22	30.07	+0.05	30.06	30.53	24	29.56	1.9	97	41.7	-6.4	67.9	31	49.9	22.5	20	35.1	45.4	26.7	15	2.8	1876.7	34.5	3.48	-2.83	12,843	ne.	52	ne.	22	15	10	12	9
Hatteras	12	30.00	+0.07	30.06	30.53	25	29.64	1.9	98	44.4	-6.4	67.9	31	49.9	22.5	20	35.1	45.4	26.7	15	5.1	680.8	34.2	3.72	-4.12	9,919	ne.	42	ne.	22	17	5	16	10
Fort Macon	11	30.08	+0.07	30.06	30.54	24	29.64	1.9	90	45.3	-6.1	64.2	31	52.3	24.2	23	37.8	40.0	21.9	2	3.5	1880.7	39.5	2.59	-3.49	11,662	sw.	60	sw.	29	12	8	11	12
New River Inlet	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilmington	52	30.04	+0.06	30.00	30.53	24	29.66	1.9	97	49.3	-5.2	71.2	10	58.8	26.2	24	40.0	45.5	30.4	10	9.2	2864.6	36.0	2.05	-2.41	5,375	sw.	27	sw.	1	14	11	10	10
Smithville	34	30.06	+0.04	30.05	30.53	24	29.65	1.9	98	45.8	-5.2	64.7	31	53.1	22.3	24	37.6	42.5	33.9	19	5.7	1177.0	38.7	2.18	-1.98	7,172	sw.	31	s.	28	10	7	14	10
Charlotte	808	29.23	+0.06	30.08	30.51	24	29.69	1.5	80	44.0	-5.8	69.0	31	55.3	24.0	21	36.6	45.0	31.0	10	7.0	2865.3	33.4	2.91	-2.75	4,435	sw.	20	w.	6	12	7	13	11
Atlanta	1,129	28.92	+0.05	30.10	30.48	24	29.80	1.9	06	47.0	-6.8	99.5	31	50.2	20.4	23	38.1	49.1	27.0	17	9.0	456.0	30.4	4.26	-2.90	7,494	sw.	32	sw.	7	10	7	13	11
Augusta	183	29.94	+0.05	30.10	30.54	24	29.75	1.5	07	49.3	-7.1	75.8	31	62.4	26.4	24	39.6	49.4	32.1	10	1.0	2807.7	39.7	1.85	-3.89	3,139	w.	18	w.	7	10	8	12	11
Charleston	52	30.04	+0.04	30.06	30.53	24	29.71	1.9	08	52.2	-5.4	71.6	27	59.9	33.5	24	44.6	63.8	14.2	10	8.2	2073.1	43.2	1.76	-2.70	5,227	sw.	24	ne.	22	10	10	9	12
Savannah	87	30.03	+0.06	30.09	30.52	24	29.70	1.9	07	54.3	-5.4	77.0	28	62.6	33.3	24	39.6	72.5	18.2	8	8.0	2633.9	44.1	3.11	-1.01	5,472	nw.	21	nw.	18	10	7	11	13
Jacksonville	57	30.03	+0.06	30.09	30.52	24	29.70	1.9	07	54.3	-5.4	77.0	28	62.6	33.3	24	39.6	72.5	18.2	8	8.0	2633.9	44.1	3.11	-1.01	5,472	nw.	21	nw.	18	10	7	11	13
Cape Lookout	43	30.08	+0.04	30.09	30.45	21	29.74	2.2																										

Table of miscellaneous meteorological data for March, 1885—Signal Service observations—Continued.

Stations.	Elevation above sea-level.	Atmospheric pressure.					Temperature of the air (In degrees Fahrenheit).												Winds.														
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Monthly range.		Daily range.		Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Max. velocity.		No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.						
					Highest barometer.	Lowest barometer.				Max.	Min.	Max.	Min.	Max.	Min.							Miles per hour.	Direction.										
Extreme northwest.																																	
Fort Buford.....	1,930	28.02	-.01	30.19	30.58	22	29.80	29.07	28.7	5.9	58.0	25	39.1	2.7	16.9	55.3	35.2	1	9.7	21	77.1	22.2	0.03	-.09	8,092	w.	58	w.	2	3	12	19	0
Bismarck.....	1,694	28.24	+.05	30.16	30.58	22	29.71	29.07	25.7	3.9	49.0	31	35.2	9.0	16.9	58.0	33.9	17	7.2	21	83.3	21.2	0.18	-.07	6,515	nw.	48	nw.	2	3	8	16	5
Fort Yates.....									30.6		63.5	8	45.2	4.5	6	16.0	68.0						0.44										
Fort Totten.....																																	
Moorhead.....	923	29.06	+.02	30.14	30.58	22	29.43	21.14	22.5	1.4	48.6	23	33.0	15.5	16.2	64.1	39.0	9	8.7	5	69.5	14.0	0.31	-.23	8,764	n.	44	n.	14	11	7	17	7
Saint Vincent.....	804	29.23	+.04	30.19	30.07	10	29.35	21.29	21.5	1.4	42.3	23	33.0	15.5	16.2	64.1	39.0	9	9.0	11	79.5	9.9	0.46	-.51	7,779	nw.	42	n.	14	11	7	17	6
Upper Mississippi valley.																																	
Saint Paul.....	801	29.16	+.03	30.07	30.46	22	29.44	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	7	3	20	8
La Crosse.....	725	29.25	+.01	30.05	30.43	10	29.40	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	8	5	15	11
Dubuque.....	665	29.34	.....	30.07	30.44	17	29.54	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	6	7	15	9
Davenport.....	615	29.42	+.07	30.10	30.44	17	29.63	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	6	7	15	9
Des Moines.....	849	29.19	+.06	30.13	30.46	16	29.72	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	1	8	13	10
Keokuk.....	618	29.43	+.08	30.11	30.45	17	29.70	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	4	2	18	11
Springfield.....	644	29.42	+.06	30.10	30.46	23	29.64	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	5	5	19	7
Saint Louis.....	583	29.51	+.09	30.13	30.50	23	29.74	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	5	5	19	7
Cairo.....	377	29.70	+.07	30.13	30.53	23	29.76	31.02	27.0	0.2	54.7	31	35.5	5.8	16.8	36.0	35.4	23	9.9	1	70.0	18.1	0.55	-.07	5,642	nw.	33	nw.	14	5	5	19	7
Missouri valley.																																	
Fort Bennett.....	1,510	28.51	.....	30.21	30.60	16	29.58	29.07	32.7	7.9	62.9	8	46.6	4.2	17.2	58.7	44.1	25	9.8	6	68.3	22.5	0.13	-.10	6,451	n.	48	nw.	14	3	5	21	5
Fort Sully.....																																	
Yankton.....	1,228	28.79	+.05	30.17	30.52	16	29.79	29.07	32.7	7.9	62.9	8	46.6	4.2	17.2	58.7	44.1	25	9.8	6	68.3	22.5	0.13	-.10	6,451	n.	48	nw.	14	2	2	21	8
Huron.....	1,305	28.68	+.04	30.16	30.50	16	29.74	29.07	32.7	7.9	62.9	8	46.6	4.2	17.2	58.7	44.1	25	9.8	6	68.3	22.5	0.13	-.10	6,451	n.	48	nw.	14	2	2	21	8
Omaha.....	1,113	28.94	+.07	30.16	30.50	17	29.79	29.07	32.7	7.9	62.9	8	46.6	4.2	17.2	58.7	44.1	25	9.8	6	68.3	22.5	0.13	-.10	6,451	n.	48	nw.	14	6	3	10	12
Leavenworth.....	842	29.22	+.08	30.14	30.49	17	29.70	29.07	32.7	7.9	62.9	8	46.6	4.2	17.2	58.7	44.1	25	9.8	6	68.3	22.5	0.13	-.10	6,451	n.	48	nw.	14	2	7	4	15
Lamar.....		29.06																															
Northern slope.																																	
Fort Assiniboine.....	2,710	27.22	+.04	30.25	30.54	24	29.95	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	6	0	15	10
Fort Benton.....	2,700	27.30	+.11	30.28	30.52	10	29.99	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	7	0	9	16
Fort Shaw.....	3,550	20.41	.....	30.22	30.46	22	29.99	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	2	7	4	11
Helena.....	4,044	25.91	.....	30.23	30.44	17	30.00	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	29	6	5	12
Fort Custer.....	3,040	26.92	+.14	30.25	30.51	10	30.02	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	2	4	9	14
Fort Maginnis.....	4,340	25.61	.....	30.21	30.41	18	30.04	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	13	6	14	11
Deadwood.....	4,000	25.40	+.12	30.24	30.44	12	30.02	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	12	3	17	11
Cheyenne.....	6,089	24.04	+.13	30.23	30.44	8	30.01	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	2	7	0	17
North Platte.....	2,841	27.15	+.10	30.19	30.44	24	29.88	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	7	3	13	15
Middle slope.																																	
Denver.....	5,294	24.79	+.14	30.22	30.43	7	29.96	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	5	8	3	14
Pike's Peak.....	14,134	17.72	.....	30.30	30.49	8	30.07	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	6	10	6	12
Lodge City.....	2,517	27.50	+.12	30.19	30.47	17	29.96	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	20	5	2	16
West Las Animas.....	3,905	26.08	+.09	30.13	30.41	1	29.75	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	27	4	5	13
Fort Elliott.....	2,650	27.32	+.10	30.13	30.39	8	29.78	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	21	6	3	14
Fort Reno.....																																	
Fort Supply.....																																	
Southern slope.																																	
Fort Sill.....	1,200	28.88	+.09	30.14	30.43	6	29.78	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	7	6	4	13
Fort Concho.....	1,900	28.20	+.11	30.12	30.42	8	29.83	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	14	8	9	15
Fort Stockton.....	3,010	27.07	+.11	30.14	30.41	1	29.83	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	3	9	5	13
Fort Davis.....	4,928	25.22	.....	30.06	30.27	8	29.82	31.06	39.6	11.0	68.2	19	52.8	15.0	17.2	58.7	44.1	25	10.1	4	70.9	30.3	0.13	-.04	8,837	sw.	42	nw.	13	21	8	6	14
Southern plateau.																																	
Fort Verde.....																																	
Prescott.....	5,3,																																

north and to an altitude of 35°. When first observed it was of a pale yellow color, which afterwards grew brighter until 8.45, when streamers, 1° in width, shot upward to an altitude of 35°; these appeared and reappeared in succession, reaching their maximum brilliancy at 9 p. m.; at 9.10 none were visible, but shortly afterwards and until 9.25, "merry dancers" flashed from east to west with great rapidity; at 9.30 the display had entirely disappeared.

Pleasant Grove, Washington Territory, 15th: an aurora was observed at 7 p. m. in the form of an arch, above which appeared flashes of light resembling distant lightning.

East Portland, Oregon: a diffuse auroral light was visible in the north throughout the night of 15-16th.

Dayton, Washington Territory, 15th: a partial display of the aurora was visible from 10.40 p. m., until obscured by clouds at 11.45 p. m.

Bismarck, Dakota, 15th: an aurora was observed from 9.30 to 11.30 p. m.; the display being partly obscured by clouds.

Saint Vincent, Minnesota, 15th: at 8.30 p. m. a broad band of light extended from 170° to 270° azimuth, and to an altitude of 30°. At 10 p. m. it disappeared but again appeared at 10.40, when bright streamers shot upward from all points between 90° and 170° and extended to the zenith; the display lasted till daylight.

Fort Totten, Dakota, 15th: from 12.10 to 7 a. m. a pale yellow auroral arch was visible in the north. From 9 p. m. of the same date until midnight, there was an auroral display consisting of three parallel arches whose altitudes were 15°, 25° and 35°, respectively, the third arch being only partially formed; shooting beams were also observed.

Saint Paul, Minnesota, 15th: at 10.50 p. m. a faint auroral light in the form of an arch was observed covering the northern horizon and extending to an altitude of 35° at the centre; beneath the arch was of a dark slate color. The display remained unchanged until 11.50 p. m., when flashes of pale light traversed the arch in rapid succession from east to west. At 12.30 a. m. of the 16th numerous slender beams shot upward to an altitude of 65°, with a rapid motion from east to west; at 1 a. m., they rose to an altitude of 80°; at 1.10 a. m. the display began to fade.

Moorhead, Minnesota, 15th: a brilliant aurora was observed at 10 p. m. with beams of whitish light extending to the zenith; at 11 p. m. the beams faded away, leaving a segment of uniform white light, covering the northern sky to an altitude of 45°; this phase continued until midnight. At 12.20 a. m. the display revived and beams of light shot upward toward the zenith, rising and falling in quick succession; at 12.30 a. m. an arch appeared rising toward the zenith; after reaching an altitude of 50° it separated into numerous striated arches extending on either side of the zenith. It remained unchanged at 12.45 a. m. after which hour no observation was made.

Cresco, Iowa, 15th: an aurora was observed at 7.45 p. m.; double at 8.30; beams in the northeast at 9 p. m.; became brighter at 11 p. m.

Guttenburg, Iowa, 15th: the sky was covered until 10 p. m.; when it cleared away an auroral display was observed; it consisted of a bright light with a few beams and a dark cloud below.

Keokuk, Iowa, 15th: when the sky cleared at 8 p. m. an aurora was visible consisting of an arch covering 60° of the horizon; the lower edge was well-defined and the upper edge indistinct. It disappeared at 11.15 p. m.

Dubuque, Iowa, 15th: an auroral display is reported to have been visible from 3 to 4.30 a. m.

Yankton, Dakota, 15th: a faint auroral arch of white light without streamers was visible after 9.30 p. m.

Huron, Dakota, 15th: bright auroral arch from 8 p. m. until after midnight.

Escanaba, Michigan, 15th: an aurora was observed at 6.55 p. m. and continued until the early morning of the 16th. There were two arches of bright yellow with "merry dancers" extending to within 20° of the zenith.

Alpena, Michigan, 15th: an aurora first appeared at 9.45 p. m. consisting of diffuse light on the northern horizon; no streamers were visible; the display ended at 10.50 p. m.

Mackinaw City, Michigan, 15th: a fine display of the aurora was visible from 7.45 p. m. until the early morning of the 16th.

Milwaukee, Wisconsin, 15th: a faint aurora was observed in the north from 8 to 10 p. m., becoming obscured by clouds at the latter hour.

Sandusky, Ohio, 15th: at 10 p. m. the northern sky presented a bright appearance through the clouds, being due to the presence of an aurora.

Toledo, Ohio, 15th: at 7.35 p. m. a brilliant aurora appeared; it consisted of clouds of white light from which luminous beams extended; the streamers were not observed after 8 p. m. but a yellow light remained visible until 3 a. m. of the 16th.

Oswego, New York, 15th: an aurora of whitish light was observed from 6.45 to 11 p. m., becoming obscured by clouds at the latter hour.

Rochester, New York, 15th: at 10.30 p. m. a faint auroral light was observed in the north-northeast, consisting of a pale yellow light without streamers or arch; the display continued until midnight.

Nashville, Tennessee, 15th: a faint aurora was first observed at 7.35 p. m. and disappeared at 8.25 p. m. The display consisted of numerous slender beams in the north-northwestern sky, covering about 20° of the horizon and extending upward 30°. The slender beams disappeared at 8.50 p. m., leaving a yellow light which extended about 5° above the horizon.

Variety Mills, Virginia, 15th: an aurora was observed at 7.35 p. m., consisting of a pale white light near the horizon from north to northwest. In a few minutes bands of streamers appeared, with rapid undulatory motion, and shooting upward 12° or 15° above the horizon. These quickly faded and were soon replaced by a steady, pale glow of light, which lasted some hours; no arch was seen.

Washington, District of Columbia, 15th: an aurora was observed at 9 p. m.; it consisted in a faint glow in the north, extending to 15° above the horizon and 30° on either side of the north point. It was hidden in ten minutes by clouds.

Burlington, Vermont, 15th: a very brilliant aurora was observed from 9 to 11 p. m. The whole of the northern sky, extending from a point in the northeast to a point about due west, and upward for about 30° above horizon, was brightly illumined, while frequent bright flashes of light appeared in the northwest.

Block Island, Rhode Island, 15th: a brilliant aurora, consisting of a white arch, very bright, and extending across the northern sky and to an altitude of 20°, was observed. Beneath the arch was a dark blue segment 10° in width, from which two columns of white light, 2° in width, extended upward to an altitude of 30°; these disappeared from the eastern horizon at 2 a. m., but later they reappeared in the northwestern sky. The display began at 1.45 a. m.; time of ending not known.

Point Judith, Rhode Island: at 11.50 p. m. on the 14th auroral beams began to stream upward from the northern horizon; they were of a faint yellow color, and extended to an altitude of 15°. The display remained unchanged until about midnight, but at 12.15 a. m. of the 15th a bright yellow arch appeared and remained until daylight. The arch, which was about 10° wide and of 8° altitude at the highest point, covered about 85° of the horizon, cutting the magnetic meridian at right angles.

Eastport, Maine, 15th: a brilliant auroral arch appeared at 12.15 a. m., extending across the northern horizon and to an altitude of 15°; beams shot upward to an altitude of 30°. The display continued until early morning.

New Haven, Connecticut, 15th: an aurora was observed from 2 until 3.15 a. m.; it consisted of a single streamer, which extended to a considerable altitude.

The following stations also reported the aurora of the 15th: Fallston, Maryland, at 9 p. m.; Woodstock, Maryland, at 8

p. m. until 10 p. m.; Lansing, Michigan, at 9 p. m.; Ann Arbor, Michigan, at 7 p. m., still visible at 10 p. m.; Manistique, Mottville, and Swartz Creek, Michigan; Northfield and Chester, Minnesota; North Volney, Ithaca, and Mountainville, New York; Statesville, North Carolina, from 7.30 to 8.30 p. m.; North Lewisburg and Wauseon, Ohio; Albany, Oregon, 8 p. m.; Dyberry and Catawissa, Pennsylvania; Dale Enterprise, Virginia, at 7 p. m.; Moorestown, New Jersey, 1 a. m.; Bainbridge Island, Washington Territory; North Colebrook, Connecticut, from midnight until morning; Norfolk, Connecticut, 2 a. m.; Webster, Dakota; Vevay and Spiceland, Indiana; Independence, Manchester, West Union, Humboldt, Oskaloosa, and Fort Madison, Iowa; Embarras, Sussex, and Prairie du Chien, Wisconsin, 8.45 p. m., 9 p. m., and 11 p. m., respectively.

The following is taken from "Nature" of April 9, 1885:

There was a considerable disturbance of the magnetograph recorded here on March 15, and had the photographic curves been developed on that day we should probably have predicted the occurrence of the aurora seen during the evening. The earth currents, which are necessary concomitants of magnetic disturbances, were probably intense enough to cause the disarrangement of the cable tests referred to by Mr. Willoughby Smith.

G. M. WHIPPLE.

Kew Observatory, Richmond, Surrey, April 7.

Auroras were also reported on the following dates:

5th.—New River Inlet, North Carolina, suspected; Sterling, Kansas.

6th.—New River Inlet, Portsmouth, Fort Macon, Smithville, and Cape Lookout, North Carolina; Mackinaw City, Michigan.

The observer at Fort Macon, North Carolina reports as follows: "At 7.35 p. m. horizontal beams of whitish color, turning to crimson, were observed in the sky from nw. to wnw., and, possibly, indicated the presence of an aurora; these bands of light continued until 8.10 p. m."

At Portsmouth, North Carolina, the observer reported that a faint display of auroral clouds was observed in the nnw. between 7.35 and 11.20 p. m. These clouds extended about 45° above the horizon and were about 12° degrees in width and of a pale yellow color; the bands of light extended horizontally and were very wide in the centre, tapering to a point at each end, with dark spaces between them. The bands of light had the appearance of luminous cirrus clouds.

7th.—Mackinaw City, Michigan, continuation of 6th.

13th.—Escanaba and Mackinaw City, Michigan.

14th.—Mackinaw City, Michigan, continuation of 13th; Portland, Maine; Point Judith, Rhode Island; Austin, Tennessee; Chester and Saint Vincent, Minnesota; Birmingham, Michigan.

16th.—Eastport, Maine; Independence, Iowa; Mackinaw City and Thornville, Michigan; Saint Vincent, Minnesota; Burlington, Vermont; Wytheville, Virginia.

17th.—Mackinaw City, Michigan, continuation of 16th; Wytheville, Virginia.

18th.—Wytheville, Virginia; Cedar Rapids, Iowa.

19th.—Bangor, Maine.

20th.—Marquette, Mackinaw City, Swartz Creek, and Alpena, Michigan; Humboldt, and Cresco, Iowa; Riley, Illinois; Prairie du Chien, Wisconsin; Saint Vincent, Minnesota; Westborough and Cambridge, Massachusetts; Eastport, Maine.

21st.—Eastport, Maine, continuation of 20th; Mackinaw City, Michigan, continuation of 20th; Saint Vincent, Minnesota, continuation of 20th; Riley, Illinois, suspected.

26th.—Mackinaw City, Michigan.

31st.—Birmingham, Michigan.

THUNDER-STORMS.

Thunder-storms are reported to have occurred in the various states and territories as follows:

Alabama.—Montgomery, 12th, 13th, 28th; Birmingham, 12th, 27th, 28th; Greensboro, 12th, 25th, 28th; Mobile, 26th.

Arizona.—Wickenburg, 9th, 11th to 14th, 19th, 25th; Prescott, 10th to 13th, 19th, 20th; Fort Grant, 9th, 10th, 12th, 13th; Fort Bowie, 8th, 14th, 19th; Fort Apache, 9th, 20th;

San Carlos, 10th, 19th, 20th; Fort Thomas, 9th; Yuma, 13th; Fort Verde, 21st; Tucson, 19th.

Arkansas.—Fort Smith, 11th, 12th; Little Rock, 12th, 26th, 27th.

California.—San Diego, 12th, 13th; Poway, 12th.

Colorado.—West Las Animas, 11th, 13th, 26th; Montrose, 21st.

Florida.—Jacksonville, 13th, 21st, 28th; Cedar Keys and Newport, 21st; Sanford, 21st, 22d; Pensacola, 26th, 28th; Key West, 4th to 7th, 22d; Fort Barrancas and Tallahassee, 21st, 28th; Limona, 22d.

Georgia.—Augusta and Milledgeville, 12th, 28th; Savannah, 28th; Atlanta, Forsyth and Athens, 12th, 27th, 28th.

Idaho.—Boisé City, 15th; Cœur d'Alene, 16th.

Illinois.—Wilton Centre, 11th; Anna, Cairo, and Sandwich, 14th.

Indiana.—Indianapolis, Spiceland, and Vevay, 11th, 14th; Greencastle, Jeffersonville, and Sunman, 14th; Laconia, 14th, 31st; Fort Wayne, 13th, 16th; Guilford, 12th, 14th; Lafayette, 16th.

Indian Territory.—Fort Reno, 11th, 26th.

Iowa.—Manchester and Muscatine, 12th; Oskaloosa, 14th.

Kansas.—Leavenworth and Manhattan, 29th, 31st; Independence, 14th, 26th, 31st; Topeka, 6th, 29th, 31st; Clay Centre, 6th, 29th; Fort Scott, 14th, 31st; Wellington, 26th; Allison and Sherlock, 12th; Atchison and Salina, 29th; Wyandotte and Yates Centre, 31st.

Kentucky.—Louisville, 14th.

Louisiana.—New Orleans, 21st, 28th; Liberty Hill, 11th, 12th; Point Pleasant, 11th, 12th, 27th, 28th; Grand Coteau, 21st, 26th, 28th.

Maine.—Eastport, 1st.

Maryland.—Cumberland, 11th.

Michigan.—Lansing, 11th; Mottville, 11th, 14th.

Missouri.—Pierce City, 20th, 21st, 28th.

Nebraska.—Harvard and Red Willow, 12th; Stockham, 29th.

Nevada.—Carson City, 18th.

New Mexico.—Santa Fé, 13th; Fort Union, 13th, 21st.

New York.—Humphrey, 14th.

North Carolina.—New River Inlet, 5th; Wash Woods, 16th, 17th, 19th, 20th; Kitty Hawk, 18th; Chapel Hill, 27th; Smithville, 28th.

Ohio.—Columbus, Jacksonborough, North Lewisburg, and Westerville, 11th; Garrettsville, 11th, 30th; Cincinnati, Cleveland, and Portsmouth, 14th; Hiram and Ruggles, 30th.

Oregon.—Lakeview, 10th.

Pennsylvania.—Grampian Hills and Leetsdale, 11th; Fallington, 16th.

Rhode Island.—Block Island, 4th.

South Carolina.—Statesburg, 27th, 28th; Aiken and Pacolet, 28th.

Tennessee.—Ashwood, 12th; Chattanooga, 12th, 27th; Nashville, 12th, 14th; Milan, 12th, 14th, 26th; Knoxville and Memphis, 12th, 27th, 28th.

Texas.—San Antonio, 12th, 13th, 15th, 20th; Palestine, 11th, 14th, 27th; Indianola, 11th, 14th, 15th, 20th; Galveston, 20th; Rio Grande City, 11th; Fort Stockton, 13th, 14th, 20th; Fort Davis, 10th, 20th; Fort Concho, 14th, 15th; Fort Elliot, 11th, 11th, 12th; El Paso, 10th; New Ulm, 12th, 14th, 15th, 20th, 21st, 22d; Cleburne, 7th, 11th, 14th; Huntsville, 12th, 14th, 25th.

Utah.—Salt Lake City, 21st.

Virginia.—Bird's Nest, 15th; Wytheville, 27th; Norfolk, 29th.

Washington Territory.—Spokane Falls, 15th.

West Virginia.—Helvetia, 11th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories as follows:

Arizona.—1st, 5th, 6th, 24th, 26th.